



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/592,839	06/13/2000	Sateesh Gopalakrishna Nadabar	20243/15	7209

23459 7590 07/28/2004

ARTHUR J. O'DEA
LEGAL DEPARTMENT
COGNEX CORPORATION
ONE VISION DRIVE
NATICK, MA 01760-2077

EXAMINER

DASTOURI, MEHRDAD

ART UNIT	PAPER NUMBER
----------	--------------

2623

DATE MAILED: 07/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/592,839

Applicant(s)

NADABAR ET AL.

Examiner

Mehrdad Dastouri

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 9, 13, 14 and 16 is/are rejected.
- 7) ☒ Claim(s) 5,6,8,10-12,15 and 17 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 13, 2004 has been entered.

Response to Amendment

2. Applicants' amendment filed March 29, 2004, has been entered and made of record.

Applicants' arguments have been fully considered but they are not persuasive. Applicants argue in essence that prior art of record (Lei et al) invention requires first a decoding step, and subsequent to any morphological operations, Lei does not attempt subsequent decodes of the image of the symbol, but instead, Lei computes the size and offset of features of the symbol.

The Examiner disagrees and indicates that Lei et al teachings meet the amended claim language. It is submitted that determining four corners of data matrix (depicted in Step 6 of Figure 9 flowchart) is a decoding process consistent with the instant application disclosure. Considering the iterative process shown in Figure 9, Steps 6-12, subsequent to the standard morphological operation illustrated in Step 10 (Filtering pre-processing), a decoding process will be performed in Step 6 (Column 6, Lines 34-66).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

4. Claims 1-4, 7, 9, 13, 14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Lei et al (U.S. 6,244,764).

Regarding Claim 1, Lei et al disclose a method of decoding a two-dimensional symbol matrix comprising the steps of:

acquiring an image of an object (Figures 1a and 1b; Column 1, Lines 53-57);
pre-processing said image to obtain a first filtered image and a second filtered image, wherein said first and second filtered images are obtained using different filters (Figure 9; Column 6, Lines 3-19); and

evaluating each of said first and second filtered images for a valid symbol by decoding, wherein said second filtered image is not evaluated unless said first filtered image fails to result in a successful evaluation (Figure 9; Column 6, Lines 28-66).

Determining four corners of data matrix (depicted in Step 6 of Figure 9 flowchart) is the decoding process. Considering the iterative process shown in Figure 9, Steps 6-12,

subsequent to the standard morphological operation illustrated in Step 10 (Filtering pre-processing), a decoding process will be performed in Step 6).

Regarding Claim 2, Lei et al further disclose the method of Claim 1 in which said pre-processing further comprises the steps of:

performing morphology on said image to obtain said first filtered image and said second filtered image comprises said image without said morphology (Column 6, Lines 42-50).

Regarding Claim 3, Lei et al further disclose the method of Claim 1 in which said pre-processing further includes smoothing and sub-sampling of said image (Column 6, Lines 30-34).

Regarding Claim 4, Lei et al further disclose the method of Claim 1 in which said step of evaluating each of said first and second filtered image further comprises the steps of

defining one of said first and second filtered image as a current image (Column 6, Lines 42-56);

locating at least one coarse location within said current image that appear to contain a symbol shape to determine a set of symbol candidate locations (Figures 3-8; Column 6, Lines 45-56);

refining at least one of said symbol candidate locations to obtain a refined symbol image (Figures 3-9; Column 3, Lines 56-67, Column 4, Lines 1-55; Column 6, Lines 28-66);

evaluating said refined symbol image to determine if it corresponds to a valid

symbol (Figures 3-9; Column 3, Lines 56-67, Column 4, Lines 1-55; Column 6, Lines 28-66); and

if said symbol image fails to correspond to a valid symbol, then repeating said steps of locating, refining and evaluating after having redefined said current image to contain said second filtered image (Column 5, Lines 51-67, Column 6, Lines 1-66).

Regarding Claim 7, Lei et al further disclose the method of Claim 4 in which said step of refining said at least one of said symbol candidate locations further comprises the steps of:

performing a variance-based analysis of each of said at least one symbol candidate locations (Figures 3-9; Column 3, Lines 56-67, Column 4, Lines 1-5); and

reducing said set of symbol candidate locations according to whether a variance calculation for a candidate location exceeds a predetermined threshold (Figures 3-9; Column 3, Lines 56-67, Column 4, Lines 1-5; Column 5, Lines 51-67, Column 6, Lines 1-66).

Regarding Claim 9, Lei et al further disclose the method of Claim 4 in which said step of evaluating said refined symbol candidate further comprises the steps of:

performing a generic refinement on said refined symbol to obtain a refined location of a plurality of locator patterns of said symbol candidate (Figures 3-9; Column 4, Lines 7-55);

then performing a symbology-specific refinement (Figures 3-9; Column 4, Lines 41-67, Column 5, Lines 1-50); and

then decoding the result of said symbology-specific refinement (Figures 3-9; Column 5, Lines 1-67, Column 6, Lines 1-66).

With regards to Claim 13, arguments analogous to those presented for Claims 1-4 and 9 are applicable to Claim 13.

With regards to Claim 14, arguments analogous to those presented for Claim 9 are applicable to Claim 14.

With regards to Claim 16, arguments analogous to those presented for Claim 1 are applicable to Claim 16.

Allowable Subject Matter

5. Claims 5, 6, 8, 10-12, 15 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 of the instant invention recites the method of Claim 4 in which said step of locating at least one coarse location further comprises the steps of:

measuring a first and second derivative of image intensity values across said image; and

identifying areas of said image in which said first and second derivatives correspond to areas approximating predetermined shape and size parameters of said two-dimensional symbol;

whereby information for each such identified area comprises a location and an orientation.

Claim 6 depends on Claim 5, and is therefore allowable.

Claim 8 of the instant invention recites the method of Claim 7 in which said variance-based analysis further comprises the steps of:

dividing each symbol candidate location into a plurality of zones;
calculating an intensity variance for each of said zones; and
calculating a variance of a sum of the variances for each of said plurality of zones;
whereby a single variance value is determined for each candidate location.

Claim 10 of the instant invention recites the method of Claim 9 in which said generic refinement further comprises the steps of:

determining a set of two-dimensional areas within said refined symbol candidate, each said two-dimensional area being located and oriented to contain 2D image information corresponding to a locator pattern of a symbol;

evaluating said 2D image information to determine a preliminary refined location where said corresponding locator pattern begins and ends; and

interpolating said preliminary refined locations obtained from two-dimensional areas corresponding to adjacent locator patterns of said symbol to determine a secondary refined location where each said locator pattern of said symbol begins and ends.

Claim 11 of the instant invention recites the method of Claim 9 in which said step of performing a symbology-specific refinement further comprises the step of:

selecting a model symbol from a predetermined set of model symbols;
evaluating said plurality of locator patterns according to said model symbol, to

determine which of said locator patterns corresponds to a symbol-specific finder pattern inherent in said model symbol; and

refining said symbol candidate by orienting said symbol candidate according to a predefined location of said finder pattern in said selected model symbol.

Claim 12 depends on Claim 11, and is therefore allowable.

Claim 15 of the instant invention recites the method of Claim 13 in which said step of decoding image information further comprises the step of:

dividing each said coarse location into a plurality of zones;

calculating an intensity variance for each of said zones;

calculating a variance of a sum of the variances for each of said plurality of zones;

whereby a single variance value is determined for each coarse location; and
discarding any coarse location having a single variance value less than a predetermined threshold;

defining a refined location of a symbol candidate by processing each remaining coarse location to determine a set of locator patterns within said coarse location;
orienting each refined location according to said set of locator patterns with respect to a selected symbol model defining locator patterns; and
interpreting information in a data region of said symbol candidate according to said orientation, and said locator patterns with respect to said selected symbol model.

Claim 17 of the instant invention recites the apparatus of Claim 16 in which said processor further comprises:

Art Unit: 2623

a morphology filter for creating said first filtered image;

a coarse location processor for determining a set of coarse locations of symbol candidate information in said image;

a generic filter for removing from said set any coarse locations that fail to meet predetermined criteria selected from the set of size, location, and orientation;

a variance filter for removing from said set any coarse locations having an intensity variance less than a predetermined threshold;

a refinement processor for determining the specific location of image information corresponding to predetermined locator patterns according to a model image selected from a set of model images;

an orientation processor for identification of a symbol orientation according to said information corresponding to predetermined locator patterns;

a symbol decoder for decoding data region information in said image; and

a symbol evaluator to determine if said decoded symbol is a valid symbol.

Contact Information

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2623

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MEHRDAD DASTOURI
PRIMARY EXAMINER

Mehrdad Dastouri

Mehrdad Dastouri
Primary Examiner
Group Art Unit 2623
July 27, 2004